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Andaman Mud Volcanoes–Tectonics, Chemistry and Hydrocarbon Reserve

SAUGATA DATTA[1], DHANAPATI HALDAR[1]

[1] *Department of Geology, University of Calcutta, India*

[2] *Department of Geology, Presidency College, India*

Mud volcanoes are a common feature, reported by several workers, in the Baratang Island of Middle Andamans, India. The association of methane gas and adsorbed hydrocarbons in the mud has been cited well by scientists working in Andamans and also by others working on other eruption areas around the world. Evidence for the presence of gas in the mudvolcano area is shown by gas venting, acoustic turbidity (acoustic masking), numerous pockmarks, acoustic voids, and acoustic windows. Our intended work centers around delineating the nature of such mud volcanoes in the above terrain, their chemical composition with special reference to the clay minerals formed under this sedimentary volcanism environment and exploiting such volcanic deposits towards potential hydrocarbon reserves. The analysis of similar mud volcanic site at Green Canyon 185, offshore Louisiana, Gulf of Mexico suggests that, at any instant of time, gas vents at variable rates in different gas channels at the same site, and that the compositional differences in these vent gases are nearly as large as can be produced by hydrate crystallization. Almost two orders of magnitude differences in venting rate between individual gas channel ways are suggested. Our work at Middle and Lesser Andamans is mostly geared towards proving or disproving this finding. Our hypothesis is compatible with geologic generalizations that venting evolves from fast (mud volcano), to intermediate (hydrate crystallization), to slow (carbonate precipitation) if venting organized into more discrete vents with time. Stable isotopes of the separated clay minerals (smectite- and illite-rich extruded mud) from the mud volcanoes will be utilized towards the knowledge of nature of volcanism in the Middle Andaman areas. The most likely mechanism believed is re-hydration of shales by both hydrocarbons and a geochemically mature fluid from greater depth within the wedge. Deep fluid source studies will be supported by our results from gas analyses, which include He-3, thermogenic C-13 in methane as well as 'ultraheavy' C-13 in CO2. The overall results should attest active local flow of geochemically different fluids along deep-seated faults penetrating the wedge, with the waters as well as the gases coming from below.